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Case: CULLN-001B

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	MARK CULLEN	Art Unit:	1764
Serial No.:	10/644,255	Examiner:	Tam Nguyen
Filed:	August 20, 2003	Confirm:	6075
For:	TREATMENT OF CRUDE OIL FRACTIONS, FOSSIL FUELS & PRODUCTS THEREOF		

Mail Stop Amendment
Commissioner for Patents
P.O.Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

PURSUANT TO 37 C.F.R. SECTION 1.97

Pursuant to 37 C.F.R. § 1.97, the following Information Disclosure Statement is submitted as listed on form PTO/SB/08B enclosed herewith in duplicate. Copies of all disclosure documents are attached hereto for the Examiner's review.

The disclosure documents attached are allowed claims in two of Applicant's European Patent Applications. In particular, Claims 1-9 in the document entitled First Auxiliary Request have been allowed in European Patent Application No. 04751584.6, which corresponds the parent case of the present application, namely, United States Patent Application Serial Number 10/431,666, now issued as United States Patent Number 7,081,196. Furthermore, Claims 1-10 in the document entitled Claims have been allowed in European Patent Application No. 04781388.6. The Examiner is advised that European Patent Application No. 04781388.6 is the European counterpart of the present application and that Claim 1 is identical to Claim 40 of the present application now being

appealed. Applicant respectfully submits that these items are of particular importance because a foreign patent office has found that these particular claims, which relate to the claims in Applicant's United States Application, are novel, non-obvious, and otherwise patentable.

Each item of information contained in the Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the present Information Disclosure Statement.

As this Information Disclosure Statement is being submitted after a Final Rejection, but within three months of receiving the communication from the European Patent Office, the fee set forth in 37 C.F.R. § 1.17(p) is being submitted herewith. If any additional fee is required, please charge Account Number 19-4330.

Respectfully submitted,

Date: 6/27/07

By: _____

Customer No.: 007663

Matthew A. Newboles
Registration No. 36,224
STETINA BRUNDA GARRED & BRUCKER
75 Enterprise, Suite 250
Aliso Viejo, California 92656
Telephone: (949) 855-1246

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Cullen Mark

CLAIMS

1. A process for removing organic sulfur from a crude oil fraction, said process comprising: in the absence of added water such as aqueous solutions.

(a) exposing said crude oil fraction to a sonic energy having a frequency ranging from about 2 kHz to about 100 kHz, and having an amplitude displacement ranging from about 10 microns to about 300 microns ;

~~(b) forming an emulsion from said crude oil fraction exposed to sonic energy;~~

(b') separating said emulsion after said ~~exposure to said~~ sonic energy into aqueous and organic phases;

~~(c) recovering said organic phase from said aqueous phase; and~~

(c) contacting said crude oil fraction from step a). ~~organic phase~~ with hydrogen gas

~~(d)~~ causing conversion of said organic sulfur to sulfur dioxide by hydrodesulphurization.

2. The process of claim 1, wherein the sonic energy has a frequency ranging from about 2 kHz to about 19 kHz,

3. The processing of claim 1 or 2 wherein said crude oil fraction is a fraction boiling within the diesel range, preferably said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

4. The process of claim 1 or 2 wherein said crude oil fraction is a fraction boiling within the gas oil range, preferably said crude oil fraction is a member selected form the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

5. The process of claim 1 or 2 wherein said sonic energy is applied at a power density ranging from about 0.01 watts/cubic cm to about 100.00 watts/cubic cm, preferably said sonic energy is applied at a power density ranging from about 1 watt/cubic cm to about 20.00 watts/cubic cm.

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6. The process of claim1 or 2, wherein the crude oil fraction further contains nitrogen-bearing compounds and in step (a) the majority of said nitrogen-bearing compounds in said crude oil fraction are oxidized, ~~and separated in step (c) said organic phases.~~

~~7. The process of claim 6 wherein prior to the application of sonic energy in step (a), a~~ hydroperoxide ~~is mixed with~~ said crude oil fraction, preferably said hydroperoxide is ~~hydrogen~~ peroxide.

7 8. The process of claim 6 wherein in step (a) said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

~~9. The process of claim 6 further comprising~~ contacting said emulsion with a transition metal catalyst during step (a), preferably said transition metal catalyst is:

- a member selected from the group consisting of metals having atomic numbers of 21 through 29,39 through 47,57 through 79; or
- a member selected from the group consisting of nickel, silver, tungsten, cobalt, molybdenum, and combinations thereof; or
- a member selected from the group consisting of nickel, silver, tungsten, and ~~combinations thereof.~~

8 9. The process of claim 6 further comprising preheating said crude oil fraction to a temperature of from about 20° C to about 200° C prior to step (a), preferably from about 40 ° C to about 125° C prior to step (a).

9 10. The process of claim 6 wherein step (a) is performed at a pressure of less than 400 psia, preferably at a pressure of equal or less than 50 psia, more preferably at a pressure within the range of from about atmospheric pressure to about 50 psia.

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CLAIMS

1. A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the presence of an oxidizing agent while exposing said crude oil fraction to sonic energy in the absence of an aqueous phase.

2. The process of Claim 1 wherein said oxidizing agent is hydrogen peroxide or a hydroperoxide.

3. The process of Claim 1 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

4. The process of Claim 1 wherein said crude oil fraction is heated to a temperature no greater than 500°C, preferably no greater than 200°C, more preferably no greater than 125°C.

5. The process of Claim 1 further performed in the absence of a surface active agent.

6. The process of Claim 1 wherein the process is performed in the absence of an oxidizing agent while exposing said crude oil fraction to sonic energy.

7. The process of Claim 1 wherein said fraction includes both sulfur-bearing compounds and nitrogen-bearing compounds, said process further comprising the steps:

(a) mixing a hydroperoxide with said crude oil fraction in the absence of an aqueous phase to form a first admixture and heating said admixture, said admixture being sufficiently heated and subjected to sonic energy in an amount sufficient to oxidize the majority of said sulfur-bearing compounds and a majority of said nitrogen-bearing compounds present in said crude oil fraction; and

(b) separating said oxidized sulfur-bearing compounds produced in step a) and separating said oxidized nitrogen-bearing compounds produced in step (a) from said crude oil fraction.

8. The process of Claim 7 wherein in step (b), said oxidized sulfur-bearing compounds and said oxidized nitrogen-bearing compounds are separated via hydrodesulfurization.

9. The process of Claim 7 wherein said crude oil fraction is a fraction boiling within:

- the diesel range, or
- the gas oil range.

10. The process of Claim 7 wherein said crude oil fraction is a member selected from the group consisting of:

- fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof;
- FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil, or
- gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.